REMARKS

In the Office Action, the examiner rejected all the pending claims 1- 24. In particular, claims 1, 2, 10, 13, 14, 15, 16, 24 and their dependant claims are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and claim the subject matter which applicant regards as his invention. Applicant has amended the claims according to clarify the ambiguities pointed out by the examiner, and respectfully request re-consideration.

Secondly, the examiner rejected claims 1-3, 9, 13-15, 21 and 24 under 35 U.S.C. 102(e) as being anticipated by Hurst et al, U.S. Patent 6,151,633." Office Action, pg. 4, lns. 1-3. Hurst et al teach "a method and apparatus for distributing multicast data. The method may be performed by a data processor and comprises the steps of forming a multicast repair tree including a sender, a plurality of heads, and a plurality of receivers, wherein at least one head is associated with the sender and at least one receiver is associated with the head; sending, by a sender to the plurality of heads and the plurality of receivers, a plurality of multicast messages at a data rate; receiving, by the sender from one of the plurality of heads, a congestion status associated with a receiver of the head; and slowing the data rate, by the sender, in accordance with the congestion status." Hurst et al, abstract.

Applicant respectfully disagree that Hurst teaches the invention of the instant application. It is clear the Hurst discloses and teaches a centralized mechanism for initiating the pruning process in which receivers which do not meet minimum reception criteria can be

isolated and removed from the multicast data distribution set-up without allowing the receivers to prune themselves independently and prematurely." Hurst, col. 2, lns. 8 - 14." This is also clearly set forth in the claims of the Hurst patent.

Compare this with the invention of the instant application. Applicant recognized that for a source in a multicast system to continually accumulate statistics for each receiver and calculate a rate or window suitable for all of the receivers, it would severely burden the processing and computational time at the source (which is what is taught by Hurst, see Hurst Fig. 8). Performing congestion control in a multicast system involving a very large number of receivers, e.g., > 100 receivers, would be a formidable undertaking (see application, background of the invention).

The instant invention addresses this problem by shifting the computational burden involved in implementing congestion control with regulation for multicast transmission to the receivers, with each receiver computing a congestion control value/parameter using its respective statistics, and then forwarding the congestion control value to the source. The source then selects a predetermined one of the congestion control values that it receives from the receivers and uses the selected value to control the transmission of data messages, all in accordance with the invention. This is completely opposite to the teachings of Hurst.

Further, Hurst does not envision nor teach the hierarchical reporting network of the instant invention, which is used to convey the congestion control values from the

receivers. Specifically, congestion control values generated by the receivers in the instant invention are consolidated at various layers by the receivers in the hierarchical reporting network so that the source receives consolidated congestion control values from just the receivers connected directly to the source, rather than a value from each of the receivers. From the amended claims of the instant application, it is clear the computational workload (in which the consolidated congestion values are generated and values from lower-levels in the hierarchy is consolidated) is handled mainly by the receivers, and not at the source.

Accordingly, Applicant respectfully request the re-consideration of the rejection of Claims 1-3, 9, 13-15, 21 and 24 under 35 U.S.C. §102(e).

Additionally, the examiner rejected claims 4-8, 10-12, 16-20 and 22-23 under 35 U.S.C. 103(a) as being unpatentable over Hurst in view of Packer et al, U.S. Patent 6,205,120 (hereinafter "Packer"). Office Action, pg. 9, para. 5. Packer teaches "a method . . . for optimally setting the receiver window size in a flow controlled protocol in order to minimize queuing in a packet telecommunications network. Embodiments according to the present invention are operable at an explicit path to identify per connection information from host address or physical interface, flow direction, or any combination of these elements. The present invention may function in conjunction with a rate detection method that determines both a message serialization delay component and a data size invariant delay component." Packer, summary of the invention.

The method disclosed by Packer is one implementation and variation on well-known forms of congestion control, which include rate based and window based controls. Specifically, Packer is applicable in a data packet communication environment which uses a sliding window method of rate control (see Packer, independent claims 1, 8 and 14). In a window based control scheme, the source stops its transmission of data packets to the receiver when it determines in a conventional manner that the number of outstanding, unacknowledged packets set for the transmission window has been reached. (The size of the window is typically based on, for example, the round trip delay between the source and receiver as well as the rate of packet losses.) The source resumes its transmission, keeping the number of outstanding data packets within the size of the window, when it receives an acknowledgment from the receiver. Similarly, the source may adjust the size of the window (i.e., the "sliding window" method of rate control used by Packer), and thus the number of outstanding packets that are transmitted during the window, based on different parameters and statistics indicative of network congestion that the source collects.

The method of Packer also runs into the same problem as Hurst, that is, a source in a multicast system would have to continually accumulate statistics for each receiver and calculate a rate or window suitable for all of the receivers, which would severely burden the processing and computational time at the source. Indeed, Packer envisions a system with one sender and one receiver (and not a plurality of receivers) only (see Packer claim 8) and does not discuss multicasting by the sender at all.

It is clear that Packer, like Hurst, also fails to teach the hierarchical reporting network of the instant invention, with multiple receivers connected to each other in a hierarchy.

Applicant submits that no combination of the Hurst and Packer references can teach this important aspect of the invention because neither of them envisions such an arrangement.

Accordingly, Applicant has amended the claims to further clarify the invention according to the above discussion. Amended Claim 1 incorporates the limitations of original Claim 2, and clearly claims this aspect of the invention. Applicant respectfully request re-consideration of all the claims.

In conclusion, it is clear that Hurst, either by itself or when combined with Packer, does not teach nor render obvious applicant' invention. Applicant respectfully requests reconsideration of the application.

Respectfully submitted,

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Marked up version of claims showing changes made

1. A data network comprising

a source that transmits data messages to a plurality of receivers, said receivers forming a multicast group [of receivers], and wherein each of [the] said plurality of receivers comprises

a first apparatus that receives [a transmitted] transmissions of data [message] messages from the source to each of said plurality of receivers and accumulates statistics relating to [the] said [transmission] transmissions of data messages from the source to [the] said receiver, [and]

a second apparatus that [generates] computes a congestion control value and sends the value to the source, and wherein the source adjusts its transmission of data packets to the receivers as a function of a selected one or more of a plurality of congestion control values that it receives from respective ones of the receivers[.],

wherein the receivers forming the multicast group also form a multilevel hierarchical reporting network that forwards a congestion control value to the source, wherein a receiver positioned at each level in said multilevel hierarchical reporting network includes apparatus that computes a new consolidated congestion control value, said new consolidated congestion control value being a function of the congestion control value that said receiver locally generates and a consolidated congestion control value that said receiver receives from receivers positioned at a preceding level in said multilevel hierarchical reporting network, and said receiver then forwarding said new consolidated

congestion control value to the source via the next succeeding level in the multilevel hierarchical reporting network.

3. The data network of claim [2] 1 wherein the source is positioned at the highest level in the reporting hierarchy.

10. The data network of 1 wherein the source inserts a time stamp in a data packet that it transmits to the multicast group of receivers and wherein the first apparatus associates a received data packet with a current time stamp and wherein said first apparatus includes apparatus that determines a trip delay from the source to [the] each of said plurality of receivers [receiver] as a function of the difference of the inserted time stamp and a current time stamp.

11. The data network of claim [2] 1 wherein each receiver further includes third apparatus that determines a trip delay to the source via the reporting network as a function of a (a) time stamp that it associates with a message containing a congestion control value that the receiver forwards to a receiver positioned at the next highest level in the reporting hierarchy, and (b) trip delay returned by the receiver positioned at the next highest level, in which the returned trip delay is indicative of the trip delay from the latter receiver to the source.

14. The data receiver of claim 13 wherein [the] said data receiver is one of a plurality of receivers that form a multicast group within the data network.

16. The data receiver of claim 13 wherein [the] said data receiver uses a window based scheme to determine a maximum expected sequence number as its respective congestion control value, and wherein the source uses the minimum of the congestion

control values that it receives as a maximum sequence number of a next packet that the source transmits to each said receiver.

24. A data transmitter comprising

a sequence number generator, and

a controller that (a) inserts the next generated sequence number in a data packet, (b) regulates [the] transmission of the data packet based on a congestion control value determined using either a rate based or window based scheme and (c) transmits [the] said data packet in accordance with [the] said congestion control value to a group of receivers forming a multicast group of receivers, in which the congestion control value is selected from a group of congestion control values received from individual ones of the receivers.